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Gong, Xianmin ; Wong, Natalie ; Wang, Dahua

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Xianmin GONG[#]

Beijing Normal University

Natalie WONG[#]

The Chinese University of Hong Kong

Dahua WANG

Beijing Normal University

# These authors equally contributed to this work.

Correspondence concerning this article should be addressed to Dahua Wang, Institute of Developmental Psychology, Beijing Normal University, Beijing 100875, China.

Email: wangdahua@bnu.edu.cn

Abstract

Are gender differences in emotion culturally universal? To answer this question, the current study compared gender differences in emotional arousal (intensity) ratings for negative and positive pictures from the International Affective Picture System (IAPS) across cultures (Chinese vs. German culture) and age (younger vs. older adults). The raters were 53 younger Germans (24 women), 53 older Germans (28 women), 300 younger Chinese (176 women), and 126 older Chinese (86 women). The results showed that gender differences in arousal ratings were moderated by culture and age: Chinese women reported higher arousal for both negative and positive pictures compared to Chinese men; German women reported higher arousal for negative pictures, but lower arousal for positive pictures compared to German men. Moreover, the gender differences were larger for older than younger adults in the Chinese sample, but smaller for older than younger adults in the German sample. The results indicated that gender differences in self-report emotional intensity induced by pictorial stimuli were more consistent with gender norms and stereotypes (i.e., women being more emotional than men), in the Chinese sample, compared with the German sample; and that gender differences were not constant across age groups. The study revealed that gender differences in emotion are neither constant nor universal, and highlighted the importance of taking culture and age into account.

Keywords: gender differences in emotion, gender roles/ norms, cross-culture, cross-age, cultural tightness

Are Gender Differences in Emotion Culturally Universal? Comparison of Emotional Intensity between Chinese and German Samples

Are gender differences in emotion culturally universal? Although gender effects on emotion have received extensive attention in the past decades (e.g., Latu, Mast, & Kaiser, 2013), this question is far from resolved due to the dynamic relationship between gender and emotion across cultures and ages. To address the issue, we analyzed previously published data (Gong & Wang, 2016; Grühn & Scheibe, 2008; Liu et al., 2009) to compare gender differences in emotional intensity induced by pictorial stimuli between Chinese and German adult samples.

Emotion-Related Gender Norms

Gender norms and roles refer to socially constructed roles, behaviors, activities, and attributes that a given society considers appropriate for men and women (World Health Organization, 2015). Gender is one of the most salient categories in human societies, and norms attached to gender cast pervasive influences upon people's minds and behaviors, including subjective experience and expression of emotions (for reviews see Brody & Hall, 2010; Chaplin & Aldao, 2013; Fiorentini, 2013; Fischer & Manstead, 2000; Shields, 2000; Simon & Nath, 2004; Wood & Eagly, 2002).

Although differences exist, Western and East Asian cultures share some major gender norms related to emotion (e.g., Cheung, 1996; Chia, Moore, Lam, Chuang, & Cheng, 1994; Leung, 2003; Louie, 2002). An illustrative example is that both cultures favor femininity among women and masculinity among men (Hofstede, 2001; Louie, 2002; Tang, Chua, & Jiaqing, 2010). Femininity and masculinity are respectively characterized by an array of defined traits:

femininity involves qualities such as gentleness, empathy, emotional sensitivity and expressiveness, whereas masculinity involves qualities such as assertiveness, independence, courage, and emotional stability (e.g., Hofstede, 2001).

Western and East Asian cultures also share similar norms and stereotypes on gender roles: women are more likely to take up relation-oriented roles (e.g., nursing and taking care of others); while men are more likely to take up task-oriented roles (e.g., earning a living, installing and fixing appliances) both at home and at work (e.g., Cheung, 1996; Wood & Eagly, 2002). To succeed in their respective social roles, women are expected to be emotionally expressive, sensitive to their own and others' emotions and emotionally labile; whereas men are expected to be rational, emotionally stable, able to control their emotions, and not easily excitable (e.g., Wood & Eagly, 2002).

These gender roles lead to expectations that women should be more emotional than men in both Western and East Asian cultures (e.g., Brody & Hall, 2010). Indeed, such expectations are adopted as gender stereotypes in many cultures. It is believed that women experience and express general (i.e., non-specific in type) emotions, including both positive and negative emotions, more intensely and frequently compared to men (e.g., Brody & Hall, 2010; Cheung, 1996; Fischer & Manstead, 2000; Wood & Eagly, 2002). As to concrete types of emotions, women are expected to be more experiential and expressive on most positive and negative emotions such as happiness, empathy, love, surprise, sadness, fear, shame, embarrassment, guilt and anxiety (e.g., Brody & Hall, 2010; Plant, Hyde, Keltner, & Devine, 2000). There are a few exceptions though—men are often expected to experience and express more powerful emotions such as anger, contempt, and pride which correspond to the aggressive traits endorsed by masculinity (Kring, 2000, Plant et al., 2000). These exceptions notwithstanding, many cultures

93 expect women to be more emotional—more experiential and expressive—on most, if not all,
94 positive and negative emotions (e.g., Brody & Hall, 2010; Fiorentini, 2013; Simon & Nath,
95 2004).
96 *Gender Norms Shape Emotions*
97 A number of psychologists and sociologists assert that these gender norms and stereotypes do
98 not only reflect social members' beliefs and observations, but also play a prescriptive role in
99 shaping the members' experience and expression of emotions (e.g., Brody & Hall, 2010; Jansz,
100 2000; Shields, 2000; Tsai, 2007; Wood & Eagly, 2002).
101 Individuals are socialized into gender norms from early childhood, and those come to
102 shape their emotions through several mechanisms (Brody & Hall, 2010; Wood & Eagly, 2002).
103 For example, individuals may internalize the gender norms and behave in accordance with them;
104 individuals may also be coerced by social pressure to follow gender norms, as they try to fit-in
105 into their assigned gender role and avoid negative social consequences such as rejection and
106 discrimination (e.g., Brody & Hall, 2010). Compliance with gender norms may also contribute to
107 the two genders' competence in their respective familial and occupational roles (Wood & Eagly,
108 2002). Gender norms thus influence the emotions individuals believe they should feel, which in
109 turn direct their emotional production and expression (Tsai, 2007; Wood & Eagly, 2002). As a
110 result, women become more emotionally experiential and expressive than men, conforming to
111 and confirming the gender norms and stereotypes (for reviews see Brody & Hall, 2010; Chaplin
112 & Aldao, 2013; Tsai, 2007).
113 Although gender norms have been loosening in both Western and East Asian cultures
114 (Brooks & Bolzendahl, 2004; Louie, 2002; Rosenmann, Reese, & Cameron, 2016), they still
115 have a substantial influence on people's minds and behaviors (Brody & Hall, 2010). For

example, gender differences in the manifestation of masculinity and femininity are still pervasive worldwide (e.g., Hofstede, 2001). Women still take-up many more domestic roles (e.g., taking care of children; for a meta-analysis see Eisend, 2010) and are more likely to pursue occupations involving traditionally feminine tasks such as caring and cooperating (Reskin & Bielby, 2005) in comparison to their male counterparts.

Culture Moderates the Effects of Gender Norms

However, people do not always comply to gender norms when they are experiencing or expressing emotions; instead, emotionality also depends on specific social contexts (Brody & Hall, 2010; Else-Quest, Higgins, Allison, & Morton, 2012; Shields, 2000; Wood & Eagly, 2002). As the stringency of gender norms has been loosening, contemporary cultures may allow for more context-dependent emotional experience and expression (e.g., Brooks & Bolzendahl, 2004). Among the contextual factors, gender differences in power and social status may have an impact on the gendered disparity in emotional experience and expression (Simon & Nath, 2004). Due to their lower power and social status in general compared to men, women often experience relatively less control over their circumstances and are more likely to find themselves in adverse and frustrating situations, resulting in stronger and more frequent negative emotions, as well as weaker and less frequent positive emotions (for reviews see Fiorentini, 2013; Simon & Nath, 2004).

The relative weight of gender norms regarding their effects on emotion would vary with the strength in which such norms are applied (Fischer & Manstead, 2000). At the cultural or societal level, the strength of social norms is usually indexed by cultural tightness (e.g., Gelfand, 2012; Uz, 2015). Compared to looser cultures, tighter cultures have clearer and stronger social

norms, as well as less tolerance and harsher sanctioning for deviant behaviors, making individuals more adherent to social norms (Gelfand, 2012).

East Asian cultures usually have higher levels of cultural tightness compared to Western cultures, that is, the former have stronger and more pervasive norms and lower tolerance for deviance (Gelfand, 2012). In accordance with this line of research, empirical studies have revealed that gender norms are more stringent, and individuals are more adherent to such norms in East Asian cultures than in Western cultures (e.g., Liu & Iwamoto, 2006), even as these cultures share many similarities in the emotional facets of gender norms. Therefore, it is reasonable to speculate that East Asians would be more likely to experience and express both positive and negative emotions as expected by gender norms compared to Westerners. Contrarily, Western women's emotionality may reflect their social context more, thus accentuating negative emotions over positive ones.

This rationale is reflected by the myriad of empirical studies, which has examined gender differences in emotion in Western cultures. These studies reveal that the gender differences may vary with emotional valence (i.e., positivity and negativity). As to negative emotions, the findings are consistent with gender norms and stereotypes: compared to men, women are more experiential and expressive regarding general negative emotions, as well as many discrete negative emotions such as disgust, sadness, upset, fear, distress, anxiety, depression, shame, guilt and embarassment (for reviews see Brody & Hall, 2010; Chaplin & Aldao, 2013; Else-quest et al., 2012). There are only a few exceptions—anger in particular—where men experience and express emotions more frequently and strongly than women (e.g., Fiorenti et al., 2013; Kring, 2000).

However, findings regarding positive emotions are mixed in Western cultures. Some researchers reported that women were more experiential and expressive on positive emotions such as happy, joy, love, affection, warmth, empathy and sympathy (e.g., Fischer & Manstead, 2000), while a comparable amount of studies identified an opposite pattern (e.g., Bradley, Codispoti, Sabatinelli, & Lang, 2001; Hess, Adams Jr, & Kleck, 2004; Nolen-Hoeksema, 2012; Simon & Nath, 2004). The inconsistent findings across valence (i.e., negativity and positivity) show that the gender stereotypes about women being more emotional are not always true in Western cultures, suggesting that gender-norm effects on emotion may vary with contexts.

There are far fewer studies into gender differences in emotion in East Asian cultures. Most of these studies find that women express and experience stronger and more frequent emotions than men, regardless of whether the emotions are positive or negative (e.g., Deng, Chang, Yang, Huo, & Zhou, 2016; Gong & Wang, 2016; Liu, Xu, & Zhou, 2009). These findings imply that gender differences in emotion could be more consistent with gender norms and stereotypes in East Asian cultures compared to Western cultures. However, the speculation remains inconclusive due to the lack of direct evidence. Extensive research has been dedicated to the investigation of emotions across cultures, and a handful compared gender differences in negative emotions between East Asian and Western cultures (e.g., Davis, Greenberger, Charles, Chen, Zhao, & Dong, 2012; Fischer & Manstead, 2000). However, few took both positive and negative emotions into account when comparing the gender differences in emotions across cultures.

Gender Differences in Emotion across Age Groups

The strength of gender norms does not only vary with culture, but with age as well. On the one hand, life-span development theories suggest that older adults may have less stringent gender norms compared to younger adults due to aging effects. Degendering theory (Silver, 2003) posits that gendered identities change with age, such that in later life gender differences diminish as both genders become less adherent to typical gender norms, e.g., women would become less feminine while men would become less masculine in the traditional sense as they age. In a similar vein, crossover theory (Guttman, 1987) posits that men and women become more like the other gender group as they grow old, e.g., older women endorse stereotypical masculinity more than younger women; while older men endorse stereotypical femininity more than younger men. The predictions rooted in these theories have received support from some studies (e.g., Hyde, Krajnik, Skuldt-Niederberger, 1991; Jones, Peskin, & Livson, 2011).

On the other hand, it is reasonable to speculate that older adults may have more stringent gender norms compared to younger adults due to cohort effects caused by socio-cultural changes. The traditional gender norms have been loosening in the contemporary society (e.g., Brooks & Bolzendahl, 2004). People are becoming less restrictive on their views and attitudes to gender norms, and are more tolerant of behaviors violating these norms (e.g., Brooks & Bolzendahl, 2004). Ideologies of gender equality have gained support in recent decades, and gender differences in many facets (e.g., social roles) have been decreasing (Pampel, 2011). It is thus very reasonable to expect that the younger generations would have less stringent gender norms traditionally endorsed by the older generations. This prediction has received support from some studies (e.g., Lemaster, Delaney, & Strough, 2017; Perales, Lersch, & Baxter, 2017;). We further argued that these cohort effects would be stronger in Chinese culture compared to Western cultures. China has undergone socio-cultural changes of gender norms for much shorter time

compared to Western societies (e.g., Hamamura, 2017), which means that the traditional gender norms held by Chinese older generations may have been less impacted by socio-cultural changes compared to their Western counterparts. Therefore, the gaps in gender norms between older and younger generations may be larger in Chinese compared to Western cultures.

Aging effects and cohort effects both impact attitudes towards gender norms, and are very difficult to tease apart (Perales et al., 2017). As described above, theories about aging effects predict less stringent gender norms while cohort effects predict more stringent gender norms among the older compared to younger adults. We argued that cohort effect may be stronger in Chinese culture compared to Western cultures, which also means that aging effects may be stronger in Western cultures compared to Chinese culture. Hence, comparted to their Western counterparts, it seems more likely for Chinese older adults to hold more stringent gender norms and related emotionality compared to younger adults. Unfortunately, we found few studies that directly compared compliance to gender norms and stereotypes about emotion or gender differences in emotion between younger and older adults across cultures.

The Present Study

To examine gender differences in emotion across cultures and across age groups, we re-analyzed previously published data of emotional ratings for the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 1999) obtained from younger and older Chinese (Gong & Wang, 2016; Liu et al., 2009) and German samples (Grühn & Scheibe, 2008). The IAPS is a standardized stimulus set which contains affective pictures of real-life scenes such as human beings, animals, landscapes, sports and objects (Lang et al., 1999). It is one of the most popular tools for research on affect and emotion, and it has been validated and used by thousands of

researchers around the world (Lang & Bradley, 2007). Based on dimensional theories of emotion (e.g., Russell, 1980), the emotionality of each IAPS picture is usually rated on two dimensions—valence (negative-positive) and arousal (calm-excited) (Lang & Bradley, 2007; Lang et al., 1999). The ratings reflect raters' subjective experience of emotions induced by the scenes in the pictures.

We compared the arousal, as the index of emotional intensity, of positive and negative pictures between the Chinese and German samples. Emotional intensity is a general term widely used outside formal models and theories of emotion (Rubin & Talarico, 2009), for example, to describe normative beliefs about gender differences in emotion. One dominant idea proposed by these models and theories of emotion is that valence and arousal are two core dimensions of emotion (for reviews see Reisenzein, 1994; Rubin & Talarico, 2009; Russell, 1980); while emotional arousal is associated with the quantity or intensity of the emotional experience, valence describes emotional quality (positivity vs. negativity) (e.g., Diener, Larsen, Levine, & Emmons, 1985; Reisenzein, 1994; Schimmack & Diener, 1997).

In the literature about gender differences in emotion, subjective experience of emotions has been measured in multiple forms. One major form is to ask participants to report emotions induced by life events which have happened or are on-going (e.g., Simon & Nath, 2004). Another major form is to assess participants' self-report subjective feelings or physiological responses induced by emotion-provoking stimuli (e.g., Bianchin & Angrilli, 2012; Costa, Braun, & Birbaumer, 2003). The former form is more ecologically valid as it captures participants' actual experience of emotions in real life but might be subject to the confounding of inter-individual and intra-individual variances in transient or situational life events. For example, someone who is experiencing very negative emotions caused by loss of his/ her spouse would

not necessarily experience the same elevated level of negative emotion at other times in his/her life. In contrast, standardized emotion-provoking stimuli are less ecologically valid but hold advantages in avoiding the confounding effects mentioned above.

Gender norms could shape individuals' thoughts about what emotions they should and want to feel and eventually their emotional experience, i.e., what they actually feel, by directing the ways that they appraise/ reappraise information, as well as the ways they produce and regulate emotions (Tsai, 2007; Wood & Eagly, 2002). As discussed above, gender norms may be more stringent and impactful in Chinese culture than in Western cultures. It is also more likely in Chinese culture than in Western cultures that these gender norms be more stringent among older compared to younger adults. We thus proposed two hypotheses:

Hypothesis 1: We expect more gender-norm consistent self-report emotional intensity—women reporting stronger emotional intensity (indexed by arousal ratings) for IAPS pictures than men regardless of emotional valence—among the Chinese sample compared to the German sample.

Hypothesis 2: We expect an interaction between age and culture on gender differences in emotional intensity (Chinese older minus Chinese younger > German older minus German younger), that is, the age effect on gender differences would be larger within the Chinese compared to the German sample.

Methods

Data, Sample, and Measures

The current study used previously published data which consisted of the cross-rater mean valence and arousal ratings for the IAPS pictures obtained from Chinese and German adult

samples: (1) the ratings of 53 younger (24 women, M_{age} = 25.2, *SD* = 3.39) and 53 older (28 women, M_{age} = 69.6, *SD* = 3.58) German adults (Grühn & Scheibe, 2008); (2) the ratings of 291 younger Chinese adults (176 women, M_{age} = 21.5, *SD* = 2.45; Liu et al., 2009); (3) and the ratings of 126 older Chinese adults (86 women, M_{age} = 67.3, *SD* = 4.96; Gong & Wang, 2016). The numbers of pictures rated in these studies were not equal because of the ongoing update of the IAPS and the exclusion of some pictures for certain samples; for instance, erotic pictures were excluded for Chinese older adults due to ethics consideration (Gong & Wang, 2016). There were 355 pictures rated by all these samples, which were submitted to data analyses in the current study.

All participants rated emotional valence and arousal basing on their subjective feelings to each picture on a 9-point scale via the same normative rating procedure as introduced in Lang et al. (1999). For valence, the scale ranged from 1 (completely unhappy) to 5 (neutral) and to 9 (completely happy[1]), with a higher score indicating a more positive feeling. For the intensity (arousal) dimension, the scale ranged from 1 (completely calm) to 9 (completely aroused), with a higher score indicating a more aroused or intense feeling.

Data Analyses

Data analyses were conducted on the 355 pieces of common pictures rated by all these Chinese and German samples (Gong & Wang, 2016; Grühn & Scheibe, 2008; Liu et al., 2009). The same set of pictures were rated in the same normative procedure by both younger and older adults

[1] As outlined in the normative ratings procedure (Lang et al., 1999), the colloquial term "unhappy" and "happy" were used instead of "negative" and "positive" on the valence scale. Participants were instructed that "happy" means feeling happy, pleased, satisfied, content, hopeful.

from China and Germany, which facilitated cross-cultural equivalence (Van de Vijver & Tanzer, 2004) and comparability of the ratings.

Previous work had shown that these samples demonstrate high cross-cultural and cross-age similarities in valence categorization, that is, these samples displayed very high resemblance in classifying pictures as positive, neutral or negative, suggesting that these pictures induced similar quality of emotions across samples (Gong & Wang, 2016). In these studies, pictures with normative valence ratings (Lang et al., 1999) ranging between 4 and 6 were categorized as neutral, those with ratings lower than 4 as negative, and those with ratings above 6 as positive (Gong & Wang, 2016; Grühn & Scheibe, 2008). Some other studies categorized pictures with normative valence ratings (Lang et al., 1999) lower than 5 (the midpoint of the 9-point scale which represents neutrality) as negative, and those with ratings higher than 5 as positive (Mikels, Larkin, Reuter-Lorenz, & Carstensen, 2005; Soares et al., 2015). In the current study, we tried both methods to categorize pictures[2], and below report on the results yielded by the latter way, in which 162 negative and 193 positive pictures were included. We then submitted the arousal ratings of these pictures yielded by these two categorization methods to a 2 (gender: man vs. woman) × 2 (valence: positive vs. negative) × 2 (age: younger vs. older) × 2 (culture: Chinese vs. German) mixed design repeated measures analysis of variance (ANOVA).

Results

Table 1 presents the cross-rater mean valence and arousal ratings of the German and Chinese samples. As displayed in **Table 2**, the four-way ANOVA showed significant main effects of

[2] The data analyses on the two sets (yielded by using two categorization methods) of arousal ratings obtained the same pattern of effects, and we thus only reported the results for the categorization method taking valence rating of 5 as the cutoff point.

316 culture (Chinese > German), $F(1, 353) = 324.49$, $p < .001$, $\eta^2_p = .48$, age (younger > older), $F(1,$
317 $353) = 15.78$, $p < .001$, $\eta^2_p = .04$, gender (women > men), $F(1, 353) = 25.39$, $p < .001$, $\eta^2_p = .07$,
318 and valence (negative > positive), $F(1, 353) = 202.68$, $p < .001$, $\eta^2_p = .37$. The four-way gender ×
319 valence × age × culture interaction was not significant, $F(1, 353) = .79$, $p = .37$, $\eta^2_p = .002$, but
320 all three-way interactions were significant (*p*s < .05; refer to Table 1 for group means and *SD*s).
321 First, the gender × valence × culture interaction was significant, $F(1, 353) = 66.21$, p
322 $< .001$, $\eta^2_p = .16$. As shown in **Figure 1**, post hoc tests revealed that Chinese women reported
323 higher arousal on both negative, $t(161) = 2.70$, $p = .008$, and positive pictures, $t(192) = 4.35$, p
324 $< .001$, compared to Chinese men, whereas German women experience higher arousal on
325 negative pictures, $t(161) = 9.35$, $p < .001$, but lower arousal on positive pictures, $t(192) = -8.49$, p
326 $< .001$, compared to German men. The results were consistent with hypothesis 1, that is, there
327 are more gender-norm consistent self-report emotional intensity, i.e., women report stronger
328 emotional intensity for IAPS pictures than men do regardless of emotional valence, among the
329 Chinese sample compared to the German sample.
330 Second, the gender × age × culture interaction was significant, $F(1, 353) = 5.22$, $p < .05$,
331 $\eta^2_p = .02$. Post hoc tests revealed that the absolute magnitude of gender difference increased with
332 age regardless of picture valence among the Chinese sample, $t(354) = -10.48$, $p < .008$, but
333 decreased with age regardless of picture valence among the German sample, $t(354) = 2.97$, p
334 $= .003$. The results showed that older adults reported lower levels of gender differences in
335 emotional intensity than younger adults did among the German sample, but the reverse was true
336 in the Chinese sample, which supported our hypothesis 2.
337
338 **Discussion**

By comparing Chinese and German adults' arousal ratings for positive and negative IAPS pictures (Gong & Wang, 2016; Grühn & Scheibe, 2008; Liu et al., 2009), the current study revealed that gender differences in emotional intensity (i.e., emotional arousal) were neither universal nor constant; instead, the gender differences differ across cultures and ages. Specifically, women reported higher emotional intensity for negative pictures, but lower intensity for positive pictures compared to men in the German sample; however, in the Chinese sample, women reported higher emotional intensity for both negative and positive pictures compared to men. Moreover, the gender differences in emotional intensity negatively related to age in the German sample, but positively associated with age in the Chinese sample.

It is widely believed and expected in both Western and Eastern cultures that women are and should be more emotional than men (e.g., Brody & Hall, 2010; Cheung, 1996). These social beliefs and norms may shape individuals' emotional experience and expression (e.g., Jansz, 2000; Shields, 2000). Our results showed that gender differences in emotional experience were more consistent with such norms in the Chinese sample compared to the German sample, which was consistent with our hypothesis 1. One interpretation of the cultural variation is that gender norms may play a more significant role in Chinese culture, which has a relatively higher level of cultural-tightness compared to the less tight German culture. It has been well illustrated in the literature that behaviors among individuals in tighter cultures are usually more adherent and compliant with social norms, including gender norms (Gelfand, 2012; Uz, 2015).

The results of the German sample showed that women experience stronger negative emotions but weaker positive emotions compared to men. The results were in accordance with some Western studies (e.g., Bianchin & Angrilli, 2012; Costa et al., 2003; Simon & Nath, 2004) which showed evidence against the universality of (gender-norm effects on) gender differences

362 in emotion. These results allude to the existence of factors other than social norms in influencing
363 women and men's emotion. It is possible that gender norms and these other factors jointly
364 determine gender differences in emotion, and gender norms may play a more critical role in
365 tighter cultures, but a weaker role in looser cultures (e.g., Gelfand, 2012). It is also possible that
366 there are some differences between German and Chinese cultures, though the two share major
367 gender norms.

368 Although not of the focus in the current study, it is noteworthy that the German and the
369 Chinese samples also significantly differed in their arousal ratings for positive pictures (see
370 **Figure** 1). Particularly, younger Chinese had significantly higher ratings for positive pictures
371 compared to younger Germans. One possible interpretation is that younger Westerners tend to
372 value and seek high-arousal emotions and stimulations, whereas younger East Asians value and
373 seek low-arousal emotions and stimulations in their daily life (e.g., Tsai, 2007). As a result,
374 younger Westerners might develop higher thresholds for evaluation of arousal and thus perceive
375 the positive pictures used in the current as less arousing compared to younger East Asians. We
376 also found that the cultural discrepancy in arousal ratings for positive pictures was smaller for
377 older compared to younger adults. This result is compatible with previous studies which found
378 that older adults in both Western and East Asian cultures valued low-arousal positive emotions
379 more, and experienced lower arousal for positive stimuli compared to their younger counterparts
380 (e.g., Scheibe, English, Tsai, & Carstensen, 2013). Such an age effect might attenuate the
381 cultural-discrepancy mentioned above.

382 The current study supported our hypothesis 2 that the age differences in emotional
383 intensity would be moderated by culture. To be specific, the gender differences in emotional
384 intensity were smaller for older than younger adults within the German sample but larger for

older than younger adults within the Chinese sample. The German sample's result was consistent with life-span development theories such as degendering theory (Silver, 2003) and crossover theory (Guttman, 1987), which assert that the stringency of gender norms decreased with aging. The Chinese sample's result was more consistent with the expected cohort effects caused by socio-cultural changes, which lead to loosened gender norms in the younger compared to older generations (e.g., Brooks & Bolzendahl, 2004). Both aging effects and cohort effects contribute to age differences in gender norms (e.g., Perales et al., 2017), and the current study implies that the weight of these effects could be moderated by culture.

There are several limitations in this study. First, we did not directly measure participants' adherence to gender norms, but rather assumed samples drawn from tighter cultures would, in general, adhere to such norms to higher degrees compared to their looser cultural counterparts, as found in the former studies (Gelfand, 2012).

Second, our data only included emotion ratings from Chinese and German samples. Future studies may include data from more countries or cultures to have a more systematic examination of gender differences in emotion. The IAPS is a standardized affective tool, and it has been widely used around the world (Lang & Bradley, 2007); therefore, a large amount of data with high cross-cultural comparability may be mined to provide a more comprehensive view on emotion between genders.

Third, pictures from the IAPS were rated on general negativity or positivity, that is, concrete emotional types (i.e., happiness, sadness, etc.) were not explicitly distinguished. Previous studies revealed that gender differences might vary with concrete emotions, as well as with different emotion components, i.e., experience, expression, and physiological reaction (e.g., for a review see Fiorentini, 2013). Gender differences may also be different for powerful (e.g.,

anger and contempt) and powerless emotions (e.g., sadness and fear) even though these emotions belong to the same valence category (Flicker, Ayoub, & Guynn, 2017). Future studies could examine if the findings in the current study could be generalized to concrete types and components of emotion.

It is also noticeable that the young German sample was about four years older than the Chinese counterpart in the current study. We argue that the age gap should not amount to significant influence on their adherence to gender norms as both samples were young adults of their early twenties at the same stage of emerging adulthood (Arnett, 2000). Furthermore, although the age groupings in the current study were somewhat arbitrary, they were consistent with the popular usage of age norms, as well as age categorizations in studies which compared age differences across cultures (e.g., McCrae et al., 1999). The lack of the raw data for each subject in the current study constrained us from directly testing this argument. However, our unpublished data on gender differences in arousal ratings for a small set of affective pictures (including 20 positive pieces and 60 negative pieces) could support our argument, showing that gender differences were not significantly different between two young adult groups (i.e., around 20 years and 24 years; data available upon request).

Despite these limitations, our findings demonstrated that gender differences in emotion were neither constant (across age) nor universal (across cultures). These findings suggest that there could be more gender-norm consistent gender differences in emotion under tighter cultures (e.g., Chinese culture) compared to looser cultures (e.g., German culture). They also suggest that gender differences in emotion are likely to decrease with age in looser cultures but may increase with age in tighter cultures. In conclusion, gender differences in emotion are shaped by multiple factors, and the current study highlights the importance of taking culture and age into account.

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Reference

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617 **Table 1.** Valence and Arousal Ratings (*M*±*SD*) for the IAPS Pictures among the German and

618 Chinese Samples

Sample	Negative pictures (*N* = 162)		Positive pictures (*N* = 193)	
	Valence	Arousal	Valence	Arousal
German				
Younger women	3.68±1.28	5.35±1.73	6.16±1.04	2.92±.66
Younger men	3.85±1.05	4.84±1.47	6.21±.85	3.21±.75
Old women	3.63±1.62	5.80±1.95	6.45±.98	2.77±.79
Old men	3.87±1.52	5.58±1.76	6.52±.96	3.06±.82
Chinese				
Younger women	3.43±1.28	4.96±.75	6.14±.96	5.52±.83
Younger men	3.81±1.04	4.83±.77	6.20±.82	5.32±.84
Old women	3.45±1.51	5.59±2.00	6.58±1.07	3.87±1.17
Old men	3.57±1.40	5.45±1.65	6.54±.95	3.54±1.06

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622 **Table 2.** Results of Analysis of Variance (ANOVA) on Arousal Ratings for IAPS Pictures

Source	Sum of Squares	*df*	Mean Square	*F*	*p*	η_p^2
Valence (V)	1636.08	1,353	1636.08	202.68	< .001	.37
Culture (C)	341.44	1, 353	341.44	324.49	< .001	.48
Age (A)	18.60	1, 353	18.60	15.78	< .001	.043
Gender (G)	10.05	1, 353	10.05	25.39	< .001	.07
V * C	544.75	1, 353	544.75	517.72	< .001	.60
V * A	419.07	1, 353	419.07	355.53	< .001	.50
V * G	11.66	1, 353	11.66	29.46	< .001	.08
C * A	106.17	1, 353	106.17	187.62	< .001	.35
C * G	4.56	1, 353	4.56	11.16	.001	.03
A * G	.22	1, 353	.22	.55	.46	.002
V * C * A	111.97	1, 353	111.97	197.87	< .001	.36
V * C * G	27.04	1, 353	27.04	66.21	< .001	.16
V * A * G	2.03	1, 353	2.03	5.03	.03	.01
C * A * G	2.01	1, 353	2.01	5.22	.02	.02
V * C * A * G	.31	1, 353	.31	.79	.37	.002

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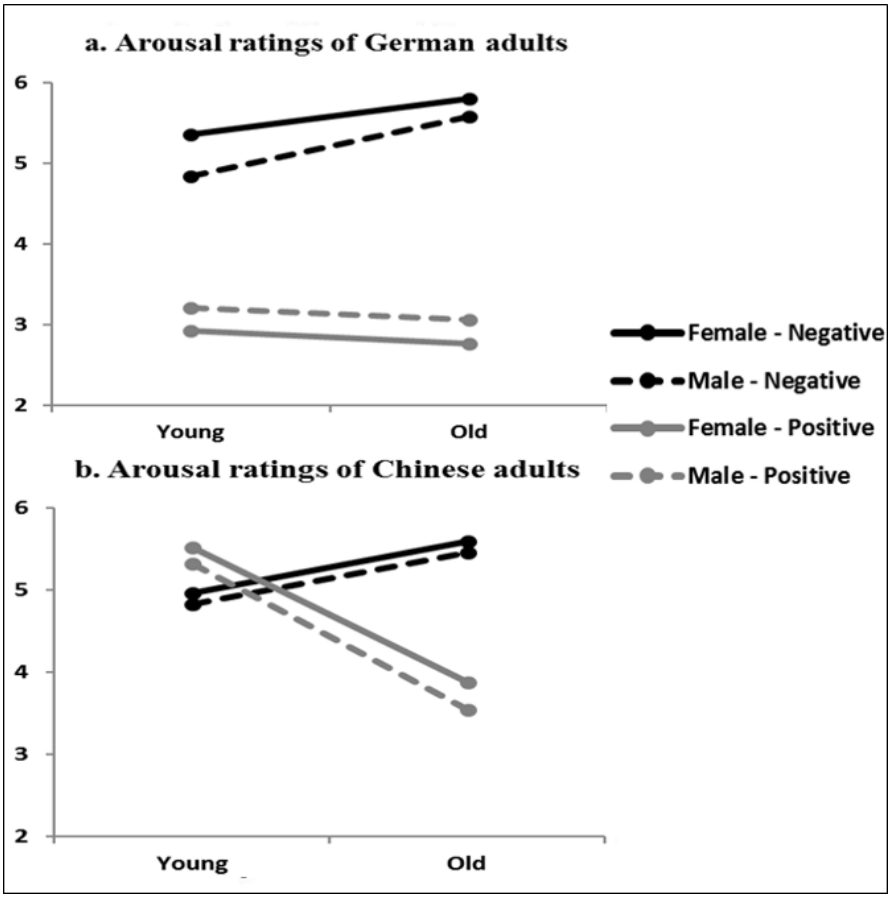

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630 **Figure 1.** Arousal ratings of women and men of different age groups in the German (upper

631 panel) and the Chinese (lower panel) samples.

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